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EXAMINER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/897,556

Filing Date: July 03, 2001

Appellant(s): OSBORN ET AL.

Patrick S. Yoder
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed on 11 September 2006 appealing from the Office
action mailed on March 6, 2006.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) *Status of Claims*

The statement of the status of claims contained in the brief is correct.

(4) *Status of Amendments After Final*

The appellants' statement of the status of amendments after final rejection contained in the brief is correct.

(5) *Summary of Claimed Subject Matter*

The summary of claimed subject matter contained in the brief is correct.

(6) *Grounds of Rejection to be reviewed on Appeal*

The appellants' statement of the grounds of rejection to be reviewed on appeal is correct.

Art Unit: 2123

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

U.S. Patent 6,549,880 to **Willoughby et al.** of April 2003.

U.S. Patent 6,223,143 to **Weinstock et al.** of April 2001.

U.S. Patent 5,625,575 to **Goyal et al.** of April 1997.

U.S. Patent Application 2003/0172002 to **Spira et al.** of September 2003.

U.S. Patent Application 2002/0183971 to **Wegerich et al.** of December 2002.

U.S. Patent 5,774,379 to **Gross et al.** of June 1998.

U.S. Patent 6,546,378 to **Cook** of April 2003.

(9) Grounds of Rejection

The following detailed grounds of rejection are applicable to the appealed claims:

(9.1) Claim Interpretations

For claim analysis and application of Art, the Examiner has interpreted the claims based on the following descriptions in the specifications regarding reliability analysis, simulation, interactive graphics display and movie mode recording and display.

The examiner refers to the following:

The user selects to perform Weibull or Lognormal analysis as shown in Fig. 10c, Item 130 and Para 0053. If so, a Weibull or Lognormal analysis is performed at Step 134. Then the user selects to perform a forecasting analysis at Step 138 and a forecasting analysis is performed at Step 142 (Para 0054). Then the user selects to perform a Strategically driven maintenance analysis (SDM) at Step 146 in Fig. 10d and an SDM analysis is performed at Step 150 (Para 0055). Then the user selects to perform a reliability analysis at Step 154 and a reliability analysis is performed at Step 156 (Para 0056). Weibull and Lognormal analysis involves Maximum Likelihood Estimation and Likelihood contour analysis, as shown in Fig. 11a and described in Para 0057. Then the appellants' reliability analysis tool displays contour plots as shown in Fig. 11b, Step 180 (Para 0058) and probability plot at Step 192 (Para 0059). The plots are displayed on the display terminal, Fig. 19, Item 338. MLE analysis and the Likelihood contour analysis involve executing a series of mathematical equations as shown in Figs. 12, 13a and 13b and described in Para 0060-0062.

Then the method performs forecasting analysis described in Para 0063-0066 and Fig. 14. It determines the historical and actual failures at Steps 244 and 262. The forecasting analysis involves simulation at Step 262. The projected and actual failures are displayed at Step 272. The simulated failure analysis involves executing a mathematical algorithm as shown in Fig. 15.

Next the method performs strategically driver maintenance analysis described in Fig. 16 and Para 0067 and computes the cost per part and cost of unscheduled shop visit using mathematical models and displays these computed values.

Then the method performs reliability analysis and computes the probability that the system will survive until time t , using appropriate mathematical equations and displays the probability on the display terminal as shown in Fig. 17 and described in Para 0068 and 0069.

Figs. 18a and 18b show the likelihood contour plot and the probability plots generated by Weibull or Lognormal analysis. Fig. 18c shows the display generated by the strategically driven maintenance analysis. Fig. 18d shows the probability of survival versus time generated by the reliability analysis. Fig 18e shows the display generated by the forecasting analysis. These displays are described in Para 0071.

The specification describes at Para 0072, the movie mode display as a succession of screen displays displayed one after the other in rapid succession. Any changes in successively displayed contents will be apparent. The movie mode display can be used for displaying the shape and scale of the Weibull analysis results. The method performs Weibull analysis over a sliding window of time ordered data and displays the results of the analysis. As the window is advanced successively over the time ordered data, the Weibull analysis refreshes the display. The successive displays are recorded in the movie. The trends may be easily spotted from the movie mode display.

Figs. 20 and 21 show that the reliability analysis involves simulation.

Based on the appellants' disclosure and the above interpretation, the Examiner sets forth the following rejections:

103 Rejections

Art Unit: 2123

Claims 1-3, 12-14, 25-27, 39-41, 50-52 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Weinstock et al.** (U.S. Patent 6,223,143), and further in view of **Goyal et al.** (U.S. Patent 5,625,575).

(9.2) **Willoughby et al.** teaches reliability of electrical distribution networks. Specifically, as per claim 1, **Willoughby et al.** teaches an interactive graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

a processor for executing instructions, a memory for storing instructions and data, a display device and an interactive graphics-based tool (Fig. 8); comprising:

an interactive selection component that provides a plurality of options for analyzing the hierarchical representation (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50); and

a reliability analysis component, responsive to the interactive selection component, that performs a reliability analysis (Abstract, L1-5 and L9-27; CL1, 43-50; CL1, L55-57; CL2, L33-35).

Willoughby et al. does not expressly teach a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7,

Art Unit: 2123

L59 to CL8, L9; Fig. 22). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Weinstock et al.** that included a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation because that would provide a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems (CL2, L66-67).

Willoughby et al. does not expressly teach a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Weinstock et al.** that included a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation because that would assess reliability and risk at failure mode at system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7).

Willoughby et al. and **Weinstock et al.** do not expressly teach a visualization component that provides a movie mode display of the reliability analysis. **Goyal et al.** teaches a visualization component that provides a movie mode display of the simulation results (CL1, L8-

Art Unit: 2123

9; CL14, L1-4; CL30, L17-26; CL31, L40-45). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **Willoughby et al.** and **Weinstock et al.** that included a reliability analysis at any level of the hierarchical representation with the system of **Goyal et al.** that included a visualization component that provided a movie mode display of the simulation results, because that would allow presenting the results of the analysis in the form of an interactive animation on a computer display terminal; the animation could be recorded on a video tape; results could be visualized later in a movie playback mode; the rate of frame display could be controlled at various speeds, for example, in slow motion; the interactive visualization capabilities would provide a convenient user interface with greater flexibility for focusing on particular areas of interest; with the movie playback capability, real time visualization could be obtained with slow motion or fast motion playback (CL14, L1-4; CL30, L17-26; CL31, L40-45). It would provide movie mode display of reliability analysis (simulation) results, so the movie could be analyzed later to focus on particular areas of interest.

(9.3) As per claim 2, **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.** teach the system of claim 1. **Willoughby et al.** and **Goyal et al.** do not expressly teach that the hierarchical representation generated by the hierarchical representation component takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node. **Weinstock et al.** teaches that the hierarchical representation generated by the hierarchical representation component takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a

Art Unit: 2123

node (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62).

(9.4) As per claim 3, **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.** teach the system of claim 2. **Willoughby et al.** teaches the plurality of options provided by the interactive selection component (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** and **Goyal et al.** do not expressly teach that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes. **Weinstock et al.** teaches that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes (Fig. 5C, Item 535 and 537; Fig. 6; Fig. 7; CL10, L45-62).

(9.5) As per claim 12, **Willoughby et al.** teaches a graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

a processor for executing instructions, a memory for storing instructions and data, a display device and a graphics-based tool (Fig. 8).

Willoughby et al. does not expressly teach means for organizing the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.**

Art Unit: 2123

teaches means for organizing the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22).

Willoughby et al. does not expressly teach means for providing a plurality of options for analyzing the hierarchical representation. **Weinstock et al.** teaches means for providing a plurality of options for analyzing the hierarchical representation (Figs. 10, 12, 13, 14A, 16, 18 and 21).

Willoughby et al. does not expressly teach means, responsive to the organizing means and the providing means, for performing a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches means, responsive to the organizing means and the providing means, for performing a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62).

Willoughby et al. and **Weinstock et al.** do not expressly teach means for generating a visualization of the reliability analysis in a movie mode display. **Goyal et al.** teaches means for generating a visualization of the simulation results (CL1, L8-9; CL14, L1-4; CL30, L17-26; CL31, L40-45). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **Willoughby et al.** and **Weinstock et al.** that included a reliability analysis at any level of the hierarchical representation with the system of **Goyal et al.** that included a visualization component that provided a movie mode display of the simulation results, because that would provide movie mode display of reliability analysis (simulation) results, so the movie could be analyzed later to focus on particular areas of interest.

(9.6) As per claim 13, **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.** teach the system of claim 12. **Willoughby et al.** and **Goyal et al.** do not expressly teach that the hierarchical representation generated by the organizing means takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node. **Weinstock et al.** teaches that the hierarchical representation generated by the organizing means takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62).

(9.7) As per claim 14, **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.** teach the system of claim 13. **Willoughby et al.** teaches the plurality of options provided by the providing means (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). and **Goyal et al.** do not expressly teach that the plurality of options provided by the providing means comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes. **Weinstock et al.** teaches that the plurality of options provided by the providing means comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes (Fig. 5C, Item 535 and 537; Fig. 6; Fig. 7; CL10, L45-62).

(9.8) As per Claims 25-27, these are rejected based on the same reasoning as Claims 1-3, and 7-9 supra. Claims 25-27 are computer-implemented method claims reciting the same limitations as Claims 1-3, as taught throughout by **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.**

(9.9) As per claim 39, **Willoughby et al.** teaches a computer-implemented method for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising computer-implemented steps for:

prompting the user to select from a plurality of analyzing options (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50);

in response to the user selection, performing a reliability analysis (Abstract, L1-5 and L9-27; CL1, L43-50; CL1, L55-57; CL2, L33-35).

Willoughby et al. does not expressly teach prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22).

Willoughby et al. does not expressly teach in response to the user selection, performing a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches in response to the user selection, performing a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62).

Willoughby et al. and **Weinstock et al.** do not expressly teach providing a visualization of the reliability analysis in a movie mode display. **Goyal et al.** teaches providing a visualization

Art Unit: 2123

of the simulation results (CL1, L8-9; CL14, L1-4; CL30, L17-26; CL31, L40-45). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **Willoughby et al.** and **Weinstock et al.** that included a reliability analysis at any level of the hierarchical representation with the system of **Goyal et al.** that included a visualization component that provided a movie mode display of the simulation results, because that would provide movie mode display of reliability analysis (simulation) results, so the movie could be analyzed later to focus on particular areas of interest.

(9.10) As per claim 40, **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.** teach the method of claim 39. **Willoughby et al.** and **Goyal et al.** do not expressly teach that the hierarchical representation takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node. **Weinstock et al.** teaches that the hierarchical representation takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62).

(9.11) As per claim 41, **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.** teach the method of claim 40. **Willoughby et al.** teaches the plurality of options provided by the interactive selection component (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** and **Goyal et al.** do not expressly teach that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation,

Art Unit: 2123

selecting a node and defining a group of nodes. **Weinstock et al.** teaches that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes (Fig. 5C, Item 535 and 537; Fig. 6; Fig. 7; CL10, L45-62).

(9.12) As per Claims 50-52 and 55 these are rejected based on the same reasoning as Claims 31-33 and 39, supra. Claims 50-52 and 55 are computer-readable medium claims reciting the same limitations as Claims 31-33 and 39, as taught throughout by **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.**

Claims 4, 15, 19-22, 24, 28, 42 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Weinstock et al.** (U.S. Patent 6,223,143) and **Goyal et al.** (U.S. Patent 5,625,575), and further in view of **Spira et al.** (U.S. Patent Application 2003/0172002).

(9.13) As per claim 4, **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.** teach the system of claim 1. **Willoughby et al.** teaches that the reliability analysis component performs at least one of a reliability prediction (CL1, L45-47; Abstract, L1-5 and L18-20; CL1, L55-57; CL3, L33-35).

Willoughby et al. and **Goyal et al.** do not expressly teach that the reliability analysis component performs at least one of a statistical analysis. **Weinstock et al.** teaches that the reliability analysis component performs at least one of a statistical analysis (CL2, L2-9).

Willoughby et al., Weinstock et al. and Goyal et al. do not expressly teach that the reliability analysis component performs at least one of a life cycle cost analysis. **Spira et al.** teaches that the reliability analysis component performs at least one of a life cycle cost analysis (Page 2, Para 0031; Page 2, Para 0032). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al., Weinstock et al. and Goyal et al.** with the system of **Spira et al.** that included the reliability analysis component performing at least one of a life cycle cost analysis because that would enhance the system owner's financial system results (profit) and lower the cost over the life time of the system, through a proactive based maintenance approach (Page 2, Para 0031; Page 2, Para 0032).

Willoughby et al., Weinstock et al. and Goyal et al. do not expressly teach that the reliability analysis component performs at least one of a maintenance projection. **Spira et al.** teaches that the reliability analysis component performs at least one of a maintenance projection (Fig. 12, Items 504 and 506; Fig. 18; Page 1, Para 0001; Page 10, Para 0137).

Willoughby et al., Weinstock et al. and Goyal et al. do not expressly teach that the reliability analysis component performs at least one of a inventory forecasting. **Spira et al.** teaches that the reliability analysis component performs at least one of a inventory forecasting (Fig. 17, Item 106; Page 10, Para 0134).

(9.14) As per claim 15, **Willoughby et al., Weinstock et al. and Goyal et al.** teach the system of claim 12. **Willoughby et al.** teaches that the reliability analysis means performs at least one

Art Unit: 2123

of a reliability prediction (CL1, L45-47; Abstract, L1-5 and L18-20; CL1, L55-57; CL3, L33-35).

Willoughby et al. and **Goyal et al.** do not expressly teach that the reliability analysis means performs at least one of a statistical analysis. **Weinstock et al.** teaches that the reliability analysis means performs at least one of a statistical analysis (CL2, L2-9).

Willoughby et al., **Weinstock et al.** and **Goyal et al.** do not expressly teach that the reliability analysis means performs at least one of a life cycle cost analysis. **Spira et al.** teaches that the reliability analysis means performs at least one of a life cycle cost analysis (Page 2, Para 0031; Page 2, Para 0032).

Willoughby et al., **Weinstock et al.** and **Goyal et al.** do not expressly teach that the reliability analysis means performs at least one of a maintenance projection. **Spira et al.** teaches that the reliability analysis means performs at least one of a maintenance projection (Fig. 12, Items 504 and 506; Fig. 18; Page 1, Para 0001; Page 10, Para 0137).

Willoughby et al., **Weinstock et al.** and **Goyal et al.** do not expressly teach that the reliability analysis means performs at least one of a inventory forecasting. **Spira et al.** teaches that the reliability analysis means performs at least one of a inventory forecasting (Fig. 17, Item 106; Page 10, Para 0134).

(9.15) As per claim 19, **Willoughby et al.** teaches a system for performing an analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

an interactive graphics-based tool for performing a reliability analysis on the system in accordance with the plurality of service data (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); the interactive graphics-based tool comprising:

an interactive selection component that provides a plurality of options for analyzing the hierarchical representation (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50); and

a first computing unit configured to serve the data repository and the interactive graphics-based tool (Fig. 8; Fig. 9, Item s 940 and 855).

Willoughby et al. does not expressly teach a data repository containing a plurality of service data for the system. **Spira et al.** teaches a data repository containing a plurality of service data for the system (Page 2, Para 0021).

Willoughby et al. and **Spira et al.** do not expressly teach a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22).

Willoughby et al. and **Spira et al.** do not expressly teach a statistical analysis component, responsive to the hierarchical representation component and the interactive selection component that performs a statistical analysis at any level of the hierarchical representation.

Weinstock et al. teaches a statistical analysis component, responsive to the hierarchical

Art Unit: 2123

representation component and the interactive selection component, that performs a statistical analysis at any level of the hierarchical representation (CL2, L2-9).

Willoughby et al., Spira et al. and Weinstock et al. do not expressly teach a visualization component that provides a movie mode display of the statistical analysis. **Goyal et al.** teaches a visualization component that provides a movie mode display of the simulation results (CL1, L8-9; CL14, L1-4; CL30, L17-26; CL31, L40-45). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **Willoughby et al., Spira et al. and Weinstock et al.** that included a statistical analysis at any level of the hierarchical representation with the system of **Goyal et al.** that included a visualization component that provided a movie mode display of the simulation results, because that would provide movie mode display of statistical analysis (simulation) results, so the movie could be analyzed later to focus on particular areas of interest.

(9.16) As per claim 20, **Willoughby et al., Weinstock et al., Goyal et al. and Spira et al.** teach the system of claim 19. **Willoughby et al., Weinstock et al. and Goyal et al.** do not expressly teach that the data repository stores historical failure data for the system. **Spira et al.** teaches that the data repository stores historical failure data for the system (Page 2, Para 0021).

(9.17) As per claim 21, **Willoughby et al., Weinstock et al., Goyal et al. and Spira et al.** teach the system of claim 19. **Willoughby et al., Goyal et al. and Spira et al.** do not expressly teach a simulator that simulates the reliability of the plurality of service data in accordance with the statistical model. **Weinstock et al.** teaches a simulator that simulates the reliability of the

Art Unit: 2123

plurality of service data in accordance with the statistical model (Fig. 5C; CL2, L2-9; Fig. 16; CL16, L44-59; CL18, L37-59).

(9.18) As per claim 22, **Willoughby et al.**, **Weinstock et al.**, **Goyal et al.** and **Spira et al.** teach the system of claim 19. **Willoughby et al.** teaches an expert system that assists the interactive graphics-based tool in performing the reliability analysis (Fig. 9, Item 850; CL2, L40-45; C114, L37-43; CL15, L14-22).

(9.19) As per claim 24, **Willoughby et al.**, **Weinstock et al.**, **Goyal et al.** and **Spira et al.** teach the system of claim 19. **Willoughby et al.**, **Weinstock et al.** and **Goyal et al.** do not expressly teach a second computing unit configured to interact with the data repository and the interactive graphics-based tool served from the first computing unit over a network. **Spira et al.** teaches a second computing unit configured to interact with the data repository and the interactive graphics-based tool served from the first computing unit over a network (Page 2, Para 0021; Page 3, Para 0037; Fig. 2; Page 3, Para 0038; Page 9, Para 0117).

(9.20) As per Claims 28 and 42, these are rejected based on the same reasoning as Claims 4 and 10, supra. Claims 28 and 42 are method claims reciting the same limitations as Claims 4 and 10, as taught throughout by **Willoughby et al.**, **Weinstock et al.**, **Goyal et al.** and **Spira et al.**

Art Unit: 2123

(9.21) As per Claim 53 it is rejected based on the same reasoning as Claim 4, supra. Claim 53 is a computer-readable medium claim reciting the same limitations as Claims 4, as taught throughout by **Willoughby et al.**, **Weinstock et al.**, **Goyal et al.** and **Spira et al.**

Claims 16, 17, 23, 36, 38, 44-46, 48, 49 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Spira et al.** (U.S. Patent Application 2003/0172002), **Wegerich et al.** (U.S. Patent Application 2002/0183971) and **Weinstock et al.** (U.S. Patent 6,223,143), and further in view of and **Goyal et al.** (U.S. Patent 5,625,575).

(9.22) As per claim 16, **Willoughby et al.** teaches a system for performing an analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

a processor for executing instructions, a memory for storing instructions and data, a display device (Fig. 8);

an interactive graphics-based tool for performing the user specified reliability analysis on the system in accordance with the plurality of service data (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); the interactive graphics-based tool comprising:

an interactive selection component that provides a plurality of options for analyzing the hierarchical representation (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50).

Willoughby et al. does not expressly teach a data repository containing a plurality of service data for the system. **Spira et al.** teaches a data repository containing a plurality of service data for the system (Page 2, Para 0021).

Willoughby et al. teaches a user specified reliability analysis selection (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** and **Spira et al.** do not expressly teach an interactive data preprocessor that preprocesses the plurality of service data in accordance with a user specified reliability analysis selection. **Wegerich et al.** teaches an interactive data preprocessor that preprocesses the plurality of service data in accordance with a user specified reliability analysis selection (Fig. 1, Item 110; Page 2, Para 0033; Page 3, Para 0034). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** and **Spira et al.** with the system of **Wegerich et al.** that included an interactive data preprocessor that preprocesses the plurality of service data in accordance with a user specified reliability analysis selection because that would allow using historical service data to learn normal states of operation and use the data for diagnostics (Page 3, Para 0037 and Page 6, Para 0062).

Willoughby et al., Spira et al. and **Wegerich et al.** do not expressly teach a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches a hierarchical representation component that organizes the system and the plurality of subsystems and

Art Unit: 2123

components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22).

Willoughby et al., Spira et al. and Wegerich et al. do not expressly teach a statistical analysis component, responsive to the hierarchical representation component and the interactive selection component, that performs a statistical analysis at any level of the hierarchical representation. **Weinstock et al.** teaches a statistical analysis component, responsive to the hierarchical representation component and the interactive selection component, that performs a statistical analysis at any level of the hierarchical representation (CL2, L2-9).

Willoughby et al., Spira et al., Wegerich et al. and Weinstock et al. do not expressly teach a visualization component that provides a movie mode display of the statistical analysis. **Goyal et al.** teaches a visualization component that provides a movie mode display of the simulation results (CL1, L8-9; CL14, L1-4; CL30, L17-26; CL31, L40-45). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **Willoughby et al., Spira et al., Wegerich et al. and Weinstock et al.** that included a statistical analysis at any level of the hierarchical representation with the system of **Goyal et al.** that included a visualization component that provided a movie mode display of the simulation results, because that would provide movie mode display of statistical analysis (simulation) results, so the movie could be analyzed later to focus on particular areas of interest.

(9.23) As per claim 17, **Willoughby et al., Spira et al., Wegerich et al., Weinstock et al. and Goyal et al.** teach the system of claim 16. **Willoughby et al.** teaches an expert system that

Art Unit: 2123

assists the interactive graphics-based tool in performing the reliability analysis (Fig. 9, Item 850; CL2, L40-45; CI14, L37-43; CL15, L14-22).

(9.24) As per claim 23, **Willoughby et al.**, **Weinstock et al.**, **Spira et al.** and **Goyal et al.** teach the system of claim 19. **Willoughby et al.**, **Weinstock et al.**, **Spira et al.** and **Goyal et al.** do not expressly teach a data preprocessor that preprocesses the plurality of service data. **Wegerich et al.** teaches a data preprocessor that preprocesses the plurality of service data (Fig. 1, Item 110; Page 2, Para 0033; Page 3, Para 0034).

(9.25) As per claim 36, **Willoughby et al.** teaches method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

providing an interactive graphics-based tool for performing the user specified reliability analysis on the system in accordance with the plurality of service data (Abstract, L1-5 and L9-27; Fig. 12E; CL1, L40-50; CL1, L55-57; CL2, L33-35); and

that the interactive graphics-based tool is configured to provide a plurality of options for analyzing the hierarchical representation (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50).

Willoughby et al. does not expressly teach storing a plurality of service data for the system. **Spira et al.** teaches storing a plurality of service data for the system (Page 2, Para 0021).

Willoughby et al. and **Spira et al.** do not expressly teach preprocessing the plurality of service data in accordance with a user specified reliability analysis selection. **Wegerich et al.** teaches preprocessing the plurality of service data in accordance with a user specified reliability analysis selection (Fig. 1, Item 110; Page 2, Para 0033; Page 3, Para 0034).

Willoughby et al., **Spira et al.** and **Wegerich et al.** do not expressly teach that the interactive graphics-based tool is configured to organize the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches that the interactive graphics-based tool is configured to organize the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22).

Willoughby et al., **Spira et al.** and **Wegerich et al.** do not expressly teach that the interactive graphics-based tool is configured to perform a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches that the interactive graphics-based tool is configured to perform a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62).

Willoughby et al., **Spira et al.**, **Wegerich et al.** and **Weinstock et al.** do not expressly teach providing a visualization of the reliability analysis as a movie mode display. **Goyal et al.** teaches providing a visualization of the simulation results as a movie mode display (CL1, L8-9; CL14, L1-4; CL30, L17-26; CL31, L40-45). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **Willoughby et al.**, **Spira et al.**, **Wegerich et al.** and **Weinstock et al.** that included a reliability analysis at any level of the

hierarchical representation with the system of **Goyal et al.** that included a visualization component that provided a movie mode display of the simulation results, because that would provide movie mode display of reliability analysis (simulation) results, so the movie could be analyzed later to focus on particular areas of interest.

(9.26) As per claim 38, **Willoughby et al.**, **Spira et al.**, **Wegerich et al.**, **Weinstock et al.** and **Goyal et al.** teach the method of claim 36. **Willoughby et al.**, **Wegerich et al.**, **Weinstock et al.** and **Goyal et al.** do not expressly teach performing a simulation, wherein the simulating predicts life cycle events and costs associated with each event. **Spira et al.** teaches performing a simulation, wherein the simulating predicts life cycle events and costs associated with each event (Page 2, Para 0031; Page 2, Para 0032).

(9.27) As per claim 44, **Willoughby et al.**, **Spira et al.**, **Wegerich et al.** and **Goyal et al.** teach the method of claim 43. **Willoughby et al.**, **Spira et al.**, **Wegerich et al.** and **Goyal et al.** do not expressly teach that the performing of the user specified reliability analysis comprises prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches that the performing of the user specified reliability analysis comprises prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22).

Art Unit: 2123

(9.28) As per claim 45, **Willoughby et al., Spira et al., Wegerich et al., Goyal et al.** and **Weinstock et al.** teach the method of claim 44. **Willoughby et al.** teaches that the performing of the user specified reliability analysis comprises prompting the user to select from a plurality of analyzing options (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50).

(9.29) As per claim 46, **Willoughby et al., Spira et al., Wegerich et al., Goyal et al.** and **Weinstock et al.** teach the method of claim 45. **Willoughby et al., Spira et al., Wegerich et al., Goyal et al.** do not expressly teach that the performing of the user specified reliability analysis comprises performing a reliability analysis at any level of the hierarchical representation in response to the user selection. **Weinstock et al.** teaches that the performing of the user specified reliability analysis comprises performing a reliability analysis at any level of the hierarchical representation in response to the user selection. (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62).

(9.30) As per claim 48, **Willoughby et al., Spira et al., Wegerich et al.** and **Goyal et al.** teach the method of claim 43. **Willoughby et al., Spira et al., Wegerich et al.** and **Goyal et al.** do not expressly teach performing a simulation of the reliability of the plurality of service data in accordance with the statistical model. **Weinstock et al.** teaches performing a simulation of the reliability of the plurality of service data in accordance with the statistical model (Fig. 5C; CL2, L2-9; Fig. 16; CL16, L44-59; CL18, L37-59).

Art Unit: 2123

(9.31) As per claim 49, **Willoughby et al.**, **Spira et al.**, **Wegerich et al.**, **Goyal et al.** and **Weinstock et al.** teach the method of claim 48. **Willoughby et al.**, **Spira et al.**, **Wegerich et al.** and **Goyal et al.** do not expressly teach simulating the reliability of the plurality of service data in accordance with the statistical model. **Weinstock et al.** teaches simulating the reliability of the plurality of service data in accordance with the statistical model (Fig. 5C; CL2, L2-9; Fig. 16; CL16, L44-59; CL18, L37-59).

Willoughby et al., **Wegerich et al.**, **Goyal et al.** and **Weinstock et al.** do not expressly teach predicting life cycle events and costs associated with each event. **Spira et al.** teaches predicting life cycle events and costs associated with each event (Page 2, Para 0031; Page 2, Para 0032).

(9.32) As per Claim 57, it is rejected based on the same reasoning as Claim 48, supra. Claim 57 is a computer-readable medium claim reciting the same limitations as Claims 48, as taught throughout by **Willoughby et al.**, **Spira et al.**, **Wegerich et al.**, **Goyal et al.** and **Weinstock et al.**

Claims 18 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Weinstock et al.** (U.S. Patent 6,223,143), and further in view of **Spira et al.** (U.S. Patent Application 2003/0172002), **Wegerich et al.** (U.S. Patent Application 2002/0183971), **Goyal et al.** (U.S. Patent 5,625,575), **Gross et al.** (U.S. Patent 5,774,379) and **Cook** (U.S. Patent 6,546,378).

Art Unit: 2123

(9.33) As per claim 18, **Willoughby et al.**, **Weinstock et al.**, **Spira et al.**, **Goyal et al.** and **Wegerich et al.** teach the system of claim 16. **Willoughby et al.**, **Weinstock et al.**, **Spira et al.**, **Goyal et al.** and **Wegerich et al.** do not expressly teach that the data preprocessor performs at least one of determining censoring times, filtering data and segmenting data. **Gross et al.** that the data preprocessor performs at least one of determining censoring times and filtering data (CL10, L46-51). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Gross et al.** that included the data preprocessor performing at least one of determining censoring times and filtering data because that would allow sensing slow degradation that occurred over a long period in the presence of noisy background (C103, L56-65).

Willoughby et al., **Weinstock et al.**, **Spira et al.**, **Goyal et al.** and **Wegerich et al.** do not expressly teach that the data preprocessor performs at least one of determining censoring times and segmenting data. **Cook** teaches that the data preprocessor performs at least one of determining censoring times and segmenting data (CL7, L10-13). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Cook** that included the data preprocessor performing at least one of determining censoring times and segmenting data because predictions could be made from interpretation of data segments (CL9, L63-65); and data segments could be used with classification modules to generate classifications (CL7, L10-13).

(9.34) As per claim 37, **Willoughby et al.**, **Spira et al.**, **Weinstock et al.**, **Wegerich et al.** and **Goyal et al.** teach the method of claim 36. **Willoughby et al.**, **Spira et al.**, **Weinstock et al.**,

Art Unit: 2123

Wegerich et al. and **Goyal et al.** do not expressly teach that the preprocessing comprises performing at least one of determining censoring times, filtering data and segmenting data.

Gross et al. that the preprocessing comprises performing at least one of determining censoring times and filtering data (CL10, L46-51).

Willoughby et al., Spira et al., Weinstock et al., Wegerich et al., Goyal et al. and **Gross et al.** do not expressly teach that the preprocessing comprises performing at least one of determining censoring times and segmenting data. **Cook** teaches that the preprocessing comprises performing at least one of determining censoring times and segmenting data (CL7, L10-13).

Claims 43 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Spira et al.** (U.S. Patent Application 2003/0172002), and further in view of **Wegerich et al.** (U.S. Patent Application 2002/0183971) and **Goyal et al.** (U.S. Patent 5,625,575).

(9.35) As per claim 43, **Willoughby et al.** teaches a method for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

prompting the user to specify a reliability analysis selection (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50);

Art Unit: 2123

performing the user specified reliability analysis (Abstract, L1-5 and L9-27; CL1, 43-50; CL1, L55-57; CL2, L33-35).

Willoughby et al. does not expressly teach storing a plurality of service data for the system. **Spira et al.** teaches storing a plurality of service data for the system (Page 2, Para 0021).

Willoughby et al. teaches a user specified reliability analysis selection (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** and **Spira et al.** do not expressly teach preprocessing the plurality of service data in accordance with the user specified reliability analysis selection. **Wegerich et al.** teaches preprocessing the plurality of service data in accordance with the user specified reliability analysis selection (Fig. 1, Item 110; Page 2, Para 0033; Page 3, Para 0034).

Willoughby et al., Spira et al. and **Wegerich et al.** do not expressly teach providing a visualization of the reliability analysis as a movie mode display. **Goyal et al.** teaches providing a visualization of the simulation results as a movie mode display (CL1, L8-9; CL14, L1-4; CL30, L17-26; CL31, L40-45). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the system of **Willoughby et al., Spira et al., Wegerich et al.** and **Weinstock et al.** that included a reliability analysis at any level of the hierarchical representation with the system of **Goyal et al.** that included a visualization component that provided a movie mode display of the simulation results, because that would provide movie mode display of reliability analysis (simulation) results, so the movie could be analyzed later to focus on particular areas of interest.

(9.36) As per Claim 56, it is rejected based on the same reasoning as Claim 43, supra. Claim 56 is a computer-readable medium claim reciting the same limitations as Claims 43, as taught throughout by **Willoughby et al.**, **Wegerich et al.**, **Spira et al.** and **Goyal et al.**

(10) Response to Argument

Appellants' arguments filed with respect to claims 1-4, 12-28, 36-46, 48-53 and 55-57 in the Appeal Brief have been fully considered and they are not persuasive. Examiner submits to the Board that the rejections applied are proper and should be maintained.

(10.1) Response to Appellants' Arguments regarding claim rejections under 35 U.S.C. §103 (a)

(10.1.1) A prima facie case of obviousness has not been established

Appellants' Arguments

The burden of establishing a prima facie case of obviousness falls on the Examiner. Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. To establish a prima facie case, the Examiner must not only show that the combination includes all of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art

would have found the claimed invention to have been obvious in light of the teachings of the references.

Examiner's response

The requirements for establishing a prima facie case of obviousness are: 1) the art used for rejection is from the same field of endeavor or is analogous 2) the prior art teaches all the claim limitations and 3) there is motivation or suggestion in the art to modify or combine the art.

1. The art used for rejection is from the same field of endeavor or is analogous

Willoughby et al. teaches a computer implemented method for analyzing an electrical distribution network to improve its reliability. The method automatically performs a reliability analysis of the distribution network. The reliability analysis includes running one or more engineering analysis modules. The method displays the results of the reliability analysis using a graphical user interface. The reliability analysis includes a reliability optimization system.

Weinstock et al. teaches a computer-based quantitative risk assessment system (QRAS) using a risk model to assess risk of failure. The risk model is built by building a hierarchy, quantifying failure modes and building event sequence diagrams. Demand based and time based quantification of failure modes are used such as uncertainty distribution, probability distributions of variables, including exponential, weibull, and conditional probability distributions. The method creates and analyzes reliability block diagrams and performs failure modes and effects analysis. The method provides hierarchical arrangement of failures. The system assesses the failure models at element, subsystem and system levels based on user supplied quantification of

Art Unit: 2123

failure modes, event sequences, system decomposition and system operating times. The method provides failure probability characterizations. A baseline simulation is created based on user inputs and run to generate the failure data. Monte Carlo simulations are used with different probability distributions in the QRAS system.

One of ordinary skill in the art knows that reliability is the probability that a component or system will function as intended for specified time of operation from the start of operation of the component or system. The component or system failures measure reliability indirectly. As described by Willoughby et al. and Weinstock et al. simulation with various probability distributions is used to determine the reliability. The simulation results are displayed on the display terminal using graphical user interface.

Goyal et al. teaches modeling and simulation of interaction of rigid bodies. The simulation generates contact forces and moments. The simulation provides a display system that renders the results of simulation in the form of interactive animation on the computer display terminal. Results are visualized through interactive animated display. The animation can be automatically recorded on a video tape. The results can be visualized during simulation or later in a movie play back mode. In movie mode, one can control the rate of frame display to play at various speeds, for example in slow motion the interactive visualization capabilities provide a very convenient user interface with greater flexibility for focusing on particular areas of interest. Movie mode allows real time visualization, as well as slow motion and fast motion playback. Thus while Willoughby et al. and Weinstock et al. provide reliability simulation and failure analyses and display of simulation results on the terminal, the Goyal et al. reference teaches use of animation and recoding the simulation and animation results on videotapes for movie mode

Art Unit: 2123

visualization. Thus the art used art analogous and are complementary to each other and will be selected by one of ordinary skill in the art to investigate the reliability of systems.

2. The prior art teaches all the claim limitations

Willoughby et al. teaches a computer implemented method for analyzing an electrical distribution network to improve its reliability (Abstract, L1-5). The system stores different configurations of the distribution network and data corresponding to the elements of the network and various engineering analysis modules. The system also includes a graphical user interface and a terminal display (Abstract, L5-13; Figs. 10-12I; CL1, L40-45). The method automatically performs a reliability analysis of the distribution network (Abstract, L18-20; CL1, L49-51). Fig. 8 shows the computer configuration used or the reliability analysis and the electrical distribution system. The reliability analysis includes running one or more engineering analysis modules (Abstract, L20-25; CL1, L45-48). The method displays the results of the reliability analysis using a graphical user interface (Abstract, L913; Figs. 10-12I; CL1, L40-43).

Therefore, the Examiner asserts that Willoughby et al. teaches an interactive graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem; comprising:

a processor for executing instructions, a memory for storing instructions and data, a display device and an interactive graphics-based tool; comprising:

an interactive selection component that provides a plurality of options for analyzing the hierarchical representation; and

Art Unit: 2123

a reliability analysis component, responsive to the interactive selection component, that performs a reliability analysis.

Weinstock et al. teaches a computer-based quantitative risk assessment system (QRAS) using a risk model to assess risk of failure (Abstract, L1-4). The risk model is built by building a hierarchy, quantifying failure modes and building event sequence diagrams (Abstract, L7-10). The baseline contains the lowest level scenarios; the analysis runs at any level of hierarchy (Abstract, L13-15). Demand based and time based quantification of failure modes are used such as uncertainty distribution, probability distributions of variables, including exponential, weibull, and conditional probability distributions (CL2, L1-9). The method creates and analyzes reliability block diagrams and performs failure modes and effects analysis (CL2, L23-27). The method provides hierarchical arrangement of failures. The system assesses the failure models at element, subsystem and system levels based on user supplied quantification of failure modes, event sequences, system decomposition and system operating times (Fig. 5A, Item 59; Fig. 5B, Item 531; CL4, L6-8; CL7, L66 to CL8, L9; Fig. 22; CL10, L26-34; CL10, L45-54). The method provides failure probability characterizations (CL2 L58-59). A baseline simulation is created based on user inputs and run to generate the failure data (CL16, L44-56). Monte Carlo simulations are used with different probability distributions in the QRAS system (CL18, L37-40).

Therefore, the examiner asserts that Weinstock et al. teaches a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. Weinstock et al. teaches a reliability analysis component, responsive

to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation.

Goyal et al. teaches modeling and simulation; and modeling of the interaction of rigid bodies (CL1, 8-10); the simulation program consists of a dynamics module that estimates the contact forces and other loads (CL13, L43-48); and a geometry module that models the mass, shape and inertial attributes of each body (CL13, L52-53); the geometry module also provides a display system that renders the results of the simulation in the form of interactive animation on a computer display terminal (CL14, L1-4). Goyal et al. teaches that the animation can be automatically recorded on a video tape; results can be visualized later in a movie playback mode; the rate of frame display can be controlled at various speeds, for example, in slow motion (CL30, L16-26); the interactive visualization capabilities provide a convenient user interface with greater flexibility for focusing on particular areas of interest; with the movie playback capability, real time visualization is obtained with slow motion or fast motion playback (CL31, L40-45).

Therefore, the Examiner asserts that Goyal et al. teaches a visualization component that provides a movie mode display of the simulation results.

3. There is motivation or suggestion in the art to modify or combine the art

There is motivation to modify the system of Willoughby et al. with the system of Weinstock et al. that included a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation; and a

Art Unit: 2123

reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation because that would provide a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems (CL2, L66-67); and that would assess reliability and risk at failure at system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7).

There is motivation to combine the system of Willoughby et al. and Weinstock et al. that included a reliability analysis at any level of the hierarchical representation with the system of Goyal et al. that included a visualization component that provided a movie mode display of the simulation results, because that would allow presenting the results of the analysis in the form of an interactive animation on a computer display terminal; the animation could be recorded on a video tape; results could be visualized later in a movie playback mode; the rate of frame display could be controlled at various speeds, for example, in slow motion; the interactive visualization capabilities would provide a convenient user interface with greater flexibility for focusing on particular areas of interest; with the movie playback capability, real time visualization could be obtained or visualization with slow motion or fast motion playback (CL14, L1-4; CL30, L17-26; CL31, L40-45). It would provide movie mode display of reliability analysis (simulation) results, so the movie could be analyzed later to focus on particular areas of interest.

Therefore, the Examiner has established a prima facie case of obviousness.

(10.1.2) Goyal fails to teach, disclose or suggest any reliability analysis or any movie mode display of the reliability analysis. Willoughby, Weinstock and Goyal cannot be fairly combined as suggested by the Examiner.

Appellants' Arguments

Each independent claim recites movie mode display of the reliability analysis. The Examiner stated that Goyal teaches a visualization component that provides movie mode display of the reliability analysis. Goyal does not describe any reliability analysis whatsoever. Goyal suggests the use of movie playback mode for displaying parts. It is not known in the art to present reliability analysis in movie mode. None of the other references teaches such display of reliability analysis. Even if combined, the reference would not teach the movie mode display of reliability analysis. The references cannot be fairly combined because Goyal does not describe any reliability analysis whatsoever.

One skilled in the art will not be motivated to use the movie mode display of mechanism parts as described in Goyal to present the reliability analysis in movie mode. There is no suggestion or motivation in the art to combine the cited references. When prior art references require a selected combination to render obvious a subsequent invention, something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. None of the references suggests the combination relied upon by the Examiner or a motivation for such a combination.

Goyal teaches display of simulated physical objects and/or components, and the simulation of the interaction of rigid bodies. The Examiner relates simulation or visualization to

reliability analysis because of mathematics. But any type of simulation or visualization will require mathematics. This does not mean that all types of simulation or visualization is equivalent to or can be even compared to reliability analysis. Goyal displays parts because parts lend themselves to display, particularly their movement in movie mode. This is not generally the case of analyses such as for reliability.

Examiner's response

The Examiner agrees with the Appellants' argument that Goyal fails to teach, disclose or suggest any reliability analysis or any movie mode display of the reliability analysis. However, the Examiner takes the position that Willoughby and Weinstock can be fairly combined with Goyal and there is motivation to combine them and it would have been obvious to one of ordinary skill in the art.

The Examiner directs the Appellant's attention to Paragraph 10.1.1 above.

The Examiner takes the position that **Goyal et al.** teaches presenting the simulation results on a display terminal for real time viewing of results during simulation. It also teaches recording the simulation results on a videotape and then viewing the tape later at various controlled speeds. Simulation is solving the mathematical model of a system on a computer and producing the results in the form of output data (numbers). The results can be presented graphically on a display screen for the user to see and can also be recorded on a videotape to play later and analyze the results.

Reliability analysis uses the mathematical models to compute some values and generate the outputs and it is a form of simulation as described by the appellants (See paragraph 9.1 above). Appellants' reliability analysis produces probability charts and outputs similar to the probability charts and outputs produced by **Goyal et al.**'s simulation. Since the reliability analysis is a form of simulation and simulation is known to display the results as graphical outputs on the terminal and record the graphical outputs on a movie tape, one of ordinary skill in the art will use the teachings of **Goyal et al.** to record the reliability simulation outputs on a video tape and play them later in a movie mode for the reasons presented in Claim 1.

(10.1.3) Goyal is a non-analogous art.

Appellants' Arguments

Goyal is simply non-analogous art. For the teachings of a reference to be prior art under 35 U.S.C. § 103, there must be some basis for concluding that the reference would have been considered by one skilled in the particular art, working on the particular problem with which the invention pertains. Non-analogous art cannot properly be pertinent prior art under 35 U.S.C. § 103. The determination of whether a reference is from a non-analogous art is set forth in a two-step test. The first determination is whether the reference is within the field of the inventor's endeavor. If it is not, one must proceed to the second step to determine whether the reference is reasonably pertinent to the particular problem with which the inventor was involved. In regard to the second step, it is determined that analogous art is that field of art which a person of ordinary skill in the art would have been apt to refer in attempting to solve the problem solved by a

Art Unit: 2123

proposed invention. To be relevant, the area of art should be where one of ordinary skill in the art would be aware that similar problems exist.

One skilled in the art of reliability analysis would not contemplate a movie mode display of reliability analysis on the basis of teachings in Goyal of movie mode display of physical parts and their simulated movement. The display or simulation of movement of parts set forth in Goyal is certainly not in the inventors' field of endeavor. According to the second element of the test, it must be determined whether the reference is reasonably pertinent to the particular problem with which the inventors were involved. Appellants submit that it is not. Goyal relates to the physics of movement of rigid bodies, such as mechanical parts. This problem is not similar to the problems associated with understanding reliability of complex systems that can be considered in a simulation. Because the problems are so different, the second prong of the test is simply not satisfied. Accordingly, Goyal is non-analogous art.

Examiner's response

The Examiner respectfully disagrees with the Appellants' argument. The Examiner takes the position that reliability analysis is a form of simulation as also described by the Appellants. Therefore, the Examiner contends that the **Goyal et al.** reference is directly applicable to the Appellants' invention.

The Examiner directs the Appellant's attention to Paragraph 10.1.1 above.

The Examiner takes the position that **Goyal et al.** teaches presenting the simulation results on a display terminal for real time viewing of results during simulation. It also teaches recording the simulation results on a videotape and then viewing the tape later at various

Art Unit: 2123

controlled speeds. Simulation is solving the mathematical model of a system on a computer and producing the results in the form of output data (numbers). The results can be presented graphically on a display screen for the user to see and can also be recorded on a videotape to play later and analyze the results.

Reliability analysis uses the mathematical models to compute some values and generate the outputs and it is a form of simulation as described by the appellants (See paragraph 9.1 above). Appellants' reliability analysis produces probability charts and outputs similar to the probability charts and outputs produced by **Goyal et al.**'s simulation. Since the reliability analysis is a form of simulation and simulation is known to display the results as graphical outputs on the terminal and record the graphical outputs on a movie tape, one of ordinary skill in the art will use the teachings of **Goyal et al.** to record the reliability simulation outputs on a video tape and play them later in a movie mode for the reasons presented in Claim 1.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this Examiner's Answer.

Art Unit: 2123

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,


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Examiner
Art Unit 2123

November 4, 2006

Conferees

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